SOUTH DAKOTA STATEWIDE FISHERIES SURVEY

2102-F-21-R-43

Name: West 81 Lake **County**: Kingsbury
Legal Description: T109N-R53W-Sec.22-27, 34-36
Location from nearest town: 4 miles south of Arlington, SD

Dates of present survey: August 16-18, 2010
Date last surveyed: August 18-20, 2008

Managed Species	Other Species
Walleye	Northern Pike
Yellow Perch	Black Bullhead
Smallmouth Bass	Yellow Bullhead
Largemouth Bass	White Bass
Muskellunge	

PHYSICAL DATA

Surface Area: 1,590 acres **Watershed area**: No data
Maximum depth: No data **Mean depth**: No data
Volume: No data **Shoreline length**: No data
Contour map available: No, shoreline only **Date mapped**: 2000 (SDSU)
Lake elevation observed during the survey: Full
Beneficial use classifications: fish and wildlife propagation and stock watering

Ownership of Lake and Adjacent Lakeshore Property

The original lake basin for West 81 Lake, known as Brush/Twin Lakes, is listed as meandered public water in the State of South Dakota Listing of Meandered Lakes. The fishery in West 81 Lake is managed by the South Dakota Department of Game, Fish, and Parks (GFP). Part of the western end of the lake lies within a Waterfowl Production Area (WPA) owned and managed by the United States Fish and Wildlife Service (USFWS). The remainder of the shoreline, other than public road right-of-ways, is privately owned.

Fishing Access

There are no boat ramps on West 81 Lake, but boats can be launched off the county road right-of-way on the southwest corner of the lake. Shore fishing access is limited to public road right-of-ways.

Field Observations of Water Quality and Aquatic Vegetation

The water in West 81 Lake was clear with a Secchi depth measurement of 76 cm (30.0 in). Large, dense beds of clasping leaf pondweed (*Potamageton richardsonii*), coontail (*Ceratophyllum demersum*), and sago pondweed (*Potamageton pectinatus*) were found around the entire lake.

BIOLOGICAL DATA

Methods:

West 81 Lake was sampled on August 16-18, 2010 with three overnight gill net sets and ten overnight trap net sets. The trap nets are constructed with 19-mm-bar-mesh (¾ in) netting, 0.9 m high x 1.5 m wide (3 ft high x 5 ft wide) frames and 18.3 m (60 ft) long leads. The gill nets are 45.7 m long x 1.8 m deep (150 ft long x 6 ft deep) with one 7.6 m (25 ft) panel each of 13, 19, 25, 32, 38 and 51-mm-bar-mesh (½, ¾, 1, 1¼, 1½, and 2 in) monofilament netting. Sampling locations are displayed in Figure 4.

Results and Discussion:

Gill Net Catch

Yellow perch (47.8%) and walleye (41.3%) were the most abundant species sampled in the gill nets this year followed by white bass, black bullhead, smallmouth bass, and northern pike (Table 1).

Table 1. Total catch from three overnight gill net sets at West 81 Lake, Kingsbury County, August 16-18, 2010.

Species	Number	Percent	CPUE[1]	80% C.I.	Mean CPUE*	PSD	RSD-P	Mean Wr
Yellow Perch	118	47.8	39.3	±19.5	61.3	11	0	98
Walleye	102	41.3	34.0	±13.6	23.3	23	1	90
White Bass	15	6.1	5.0	±2.2	0.4	90	10	100
Black Bullhead	10	4.0	3.3	±6.0	27.1	60	20	97
Smallmouth Bass	1	0.4	0.3	±0.4	0.2	--	--	--
Northern Pike	1	0.4	0.3	±0.4	2.5	--	--	--

* Five years (2000, 2002, 2004, 2006, 2008).

Table 2. Catch per unit effort by length category for various fish species captured with gill nets in West 81 Lake, August 16-18, 2010.

Species	Substock	Stock	S-Q	Q-P	P+	All sizes	80% C.I.
Yellow Perch	15.7	23.7	21.0	2.7	--	39.3	±19.5
Walleye	0.3	33.7	26.0	7.3	0.3	34.0	±13.6
White Bass	1.7	3.3	0.3	2.7	0.3	5.0	±2.2
Black Bullhead	--	3.3	1.3	1.3	0.7	3.3	±6.0
Smallmouth Bass	0.3	--	--	--	--	0.3	±0.4
Northern Pike	--	0.3	--	0.3	--	0.3	±0.4

Length categories can be found in Appendix A.

[1] See Appendix A for definitions of CPUE, PSD, and mean Wr.

Trap Net Catch

Yellow bullhead (31.3%), largemouth bass (23.5%), and walleye (22.3%) were the most common species in the trap-net catch. Nine other species made up the rest of the catch (Table 2). Submerged aquatic vegetation is very abundant along the shorelines of West 81 Lake and likely had a negative impact on trap net catches.

Table 3. Total catch from nine overnight trap net sets at West 81 Lake, Kingsbury County, August 16-18, 2010.

Species	Number	Percent	CPUE	80% C.I.	Mean CPUE*	PSD	RSD-P	Mean Wr
Yellow Bullhead	52	31.3	5.2	±2.2	1.5	100	98	100
Largemouth Bass	39	23.5	3.9	±2.2	0.1	--	--	--
Walleye	37	22.3	3.7	±2.4	1.5	25	14	90
Yellow Perch	9	5.4	0.9	±0.6	7.8	--	--	--
White Bass	8	4.8	0.8	±0.7	0.0	--	--	--
Black Bullhead	7	4.2	0.7	±0.3	408.8	--	--	--
Smallmouth Bass	5	3.0	0.5	±0.3	0.3	--	--	--
Bluegill	4	2.4	0.4	±0.4	0.1	--	--	--
Green Sunfish	2	1.2	0.2	±0.2	0.3	--	--	--
O. S. Sunfish	1	0.6	0.1	±0.1	0.0	--	--	--
Northern Pike	1	0.6	0.1	±0.1	0.4	--	--	--
White Sucker	1	0.6	0.1	±0.1	0.0	--	--	--

* Five years (2000, 2002, 2004, 2006, 2008).

Table 4. Catch per unit effort by length category for various fish species captured with trap nets in West 81 Lake August 16-18, 2010.

Species	Substock	Stock	S-Q	Q-P	P+	All sizes	80% C.I.
Yellow Bullhead	--	5.2	--	0.1	5.1	5.2	±2.2
Largemouth Bass	3.8	0.1	--	--	0.1	3.9	±2.2
Walleye	0.1	3.6	2.7	0.4	0.5	3.7	±2.4
Yellow Perch	--	0.9	0.5	0.4	--	0.9	±0.6
White Bass	0.2	0.6	0.5	--	0.1	0.8	±0.7
Black Bullhead	0.1	0.6	0.3	0.3	--	0.7	±0.3
Smallmouth Bass	0.3	0.2	--	0.1	0.1	0.5	±0.3
Bluegill	--	0.4	0.4	--	--	0.4	±0.4
Green Sunfish	--	0.2	0.2	--	--	0.2	±0.2
O. S. Sunfish*	--	--	--	--	--	0.1	±0.1
Northern Pike	--	0.1	--	--	0.1	0.1	±0.1
White Sucker	--	0.1	--	--	0.1	0.1	±0.1

*No length categories established. Length categories can be found in Appendix A.

Walleye

Management objective: Maintain a walleye population with a gill-net CPUE of at least 15, a PSD range of 30-60, and a growth rate of 14 inches by age-3 in three out of five surveys.

Walleye CPUE was above the 10-year average and above the management objective for abundance (Table 5). The population is currently dominated by naturally-produced, age-1 fish. Growth is above regional, statewide and large lake averages with fish exceeding 40 cm (16 inches) before age-3 (Table 6). Mostly young walleyes (1-3 years old) were sampled in 2010 (Table 6) and only one fish exceeded 51 cm (20 in) (Figure 1). However, many large walleyes were observed during a spring netting operation, which is another example of summer gill netting bias.

Table 5. Walleye gill-net CPUE, PSD, RSD-P, and mean Wr for West 81 Lake, Kingsbury County, 2002-2010.

	2002	2003	2004	2005	2006	2007	2008	2009	2010	Mean*
CPUE	5.3		5.3		65.0		32.3		34.0	23.3
PSD	75		20		23		66		23	56
RSD-P	0		30		6		24		1	19
Mean Wr	97		93		95		88		90	94

*5 years (2000, 2002, 2004, 2006, 2008)

Table 6. Weighted mean length at capture (mm) for walleye captured in gill nets in West 81 Lake, Kingsbury County, 2002-2010. Note: sampling was conducted at approximately the same time during each year allowing comparisons among years to monitor growth trends. Sample size is shown in parentheses.

Year	1	2	3	4	5	6	7	8	9	10	11	13
2010 (102)	322 (78)	436 (3)	471 (20)	--	--	--	--	--	--	--	--	--
2008 (93)	248 (48)	412 (6)	462 (18)	501 (3)	530 (8)	532 (1)	515 (1)	--	557 (4)	612 (2)	--	614 (2)
2006 (78)	344 (61)	415 (2)	473 (7)	457 (3)	553 (1)	510 (1)	605 (3)	--	--	--	--	--
2004 (30)	294 (1)	426 (1)	452 (6)	490 (4)	541 (10)	594 (5)	642 (1)	660 (2)	--	--	--	--
2002 (16)	311 (3)	404 (4)	455 (8)	--	509 (1)	--	--	--	--	--	--	--

Yellow Perch

Management objective: Maintain a yellow perch population with a gill-net CPUE of at least 50 and a PSD range of 30-60 in three out of five surveys.

Yellow perch gill-net CPUE has increased following a 10-year low in 2008 (Table 7). Most of the perch sampled were age-0 fish measuring 80-100 mm (3.1 – 4.0 in) long or age-1 fish measuring 150–200 mm (5.9 – 7.9 in) long (Figure 2). No yellow perch have ever been stocked in West 81 by GFP (Table 7).

Table 7. Yellow perch gill-net CPUE, PSD, RSD-P, and mean Wr for West 81 Lake, Kingsbury County, 2002-2010.

	2002	2003	2004	2005	2006	2007	2008	2009	2010	Mean*
CPUE	74.7		21.3		52.5		5.3		39.3	61.3
PSD	13		12		--		13		11	24
RSD-P	3		5		--		6		0	4
Mean Wr	101		99		--		119		98	104

*5 years (2000, 2002, 2004, 2006, 2008)

Muskellunge

On April 28 and May 5, 2009, twelve 100 ft. long 2½-inch mesh (bar measure) gill nets were used to sample muskies in W. 81 Lake. The nets fished for two hours, midday. Five muskies were sampled ranging in length from 705 mm (27.8 in) to 874 mm (34.4 in) (Figure 3) with an average relative weight of 86.

All Species

Of the fourteen species sampled in West 81 Lake, only five have been stocked by Game, Fish and Parks. Fortunately, no carp or buffalo have ever been sampled in the lake (Table 8). White bass CPUE has increased, white sucker and orange spotted sunfish were sampled for the first time this year.

Table 8. Gill-net (GN) and trap-net (TN) CPUE for all fish species sampled in West 81 Lake, Kingsbury County, 2002-2010.

Species	2002	2003	2004	2005	2006	2007	2008	2009	2010
WHS (GN)	--		--		--		--		--
WHS (TN)	--		--		--		--		0.1
BLB (GN)	25.0		--		--		--		3.3
BLB (TN)	1,065.4		0.6		0.7		1.2		0.7
YEB (GN)	--		--		--		--		--
YEB (TN)	--		3.4		4.3		--		5.2
NOP (GN)	5.7		--		1.0		1.0		0.3
NOP (TN)	--		1.7		0.2		0.2		0.1
WHB (GN)	--		--		--		2.0		5.0
WHB (TN)	--		--		--		--		0.8
GSF (GN)	--		--		--		--		--
GSF (TN)	--		--		1.7		--		0.2
OSF (GN)	--		--		--		--		--
OSF (TN)	--		--		--		--		0.1
BLG (GN)	--		--		--		--		--
BLG (TN)	--		--		0.3		--		0.4
SMB (GN)	--		--		1.0		--		0.3
SMB (TN)	--		0.1		0.1		1.4		0.5
LMB (GN)	--		--		--		--		--
LMB (TN)	--		--		0.7		--		3.9
BLC (GN)	--		--		--		--		--
BLC (TN)	--		--		--		0.1		--
YEP (GN)	74.7		21.3		52.5		5.3		39.3
YEP (TN)	5.7		0.1		--		1.2		0.9
WAE (GN)	5.3		5.3		65.0		32.3		34.0
WAE (TN)	1.4		3.3		1.4		1.6		3.7

WHS (White Sucker), BLB (Black Bullhead), YEB (Yellow Bullhead), NOP (Northern Pike), WHB (White Bass), GSF (Green Sunfish), OSF (Orange Spotted Sunfish), BLG (Bluegill), SMB (Smallmouth Bass), LMB (Largemouth Bass), BLC (Black Crappie), YEP (Yellow Perch), WAE (Walleye)

MANAGEMENT RECOMMENDATIONS

1. Stock walleye fry or fingerlings as needed to accomplish the management objective.

2. Stock yellow perch fry, fingerlings or adults as needed to accomplish the management objective.

3. Accomplish the black bullhead management objective by maintaining predator abundance.

4. Monitor the West 81 fishery by continuing to conduct lake surveys every other year.

5. Explore opportunities to develop boat and shore fishing access.

6. Complete a contour map of the lake. Determine which waters are connected and include connected waters in management activities.

7. Adjust lake survey schedule and sampling techniques to avoid vegetation and more effectively sample the smallmouth bass, largemouth bass and muskellunge populations.

Table 9. Stocking record for West 81 Lake, Kingsbury County, 1999-2010.

Year	Number	Species	Size
1999	2,500,000	Walleye	Fry
2002	1,250,000	Walleye	Fry
2003	20,800	Bluegill	Fingerling
	25,140	Largemouth Bass	Fingerling
	56,900	Smallmouth Bass	Fingerling
	185,900	Walleye	Fingerling
2004	77,055	Largemouth Bass	Fingerling
2005	1,500	Muskellunge	Juvenile
	154,300	Walleye	Fingerling
2006	905	Muskellunge	Juvenile
	139	Smallmouth Bass	Adult

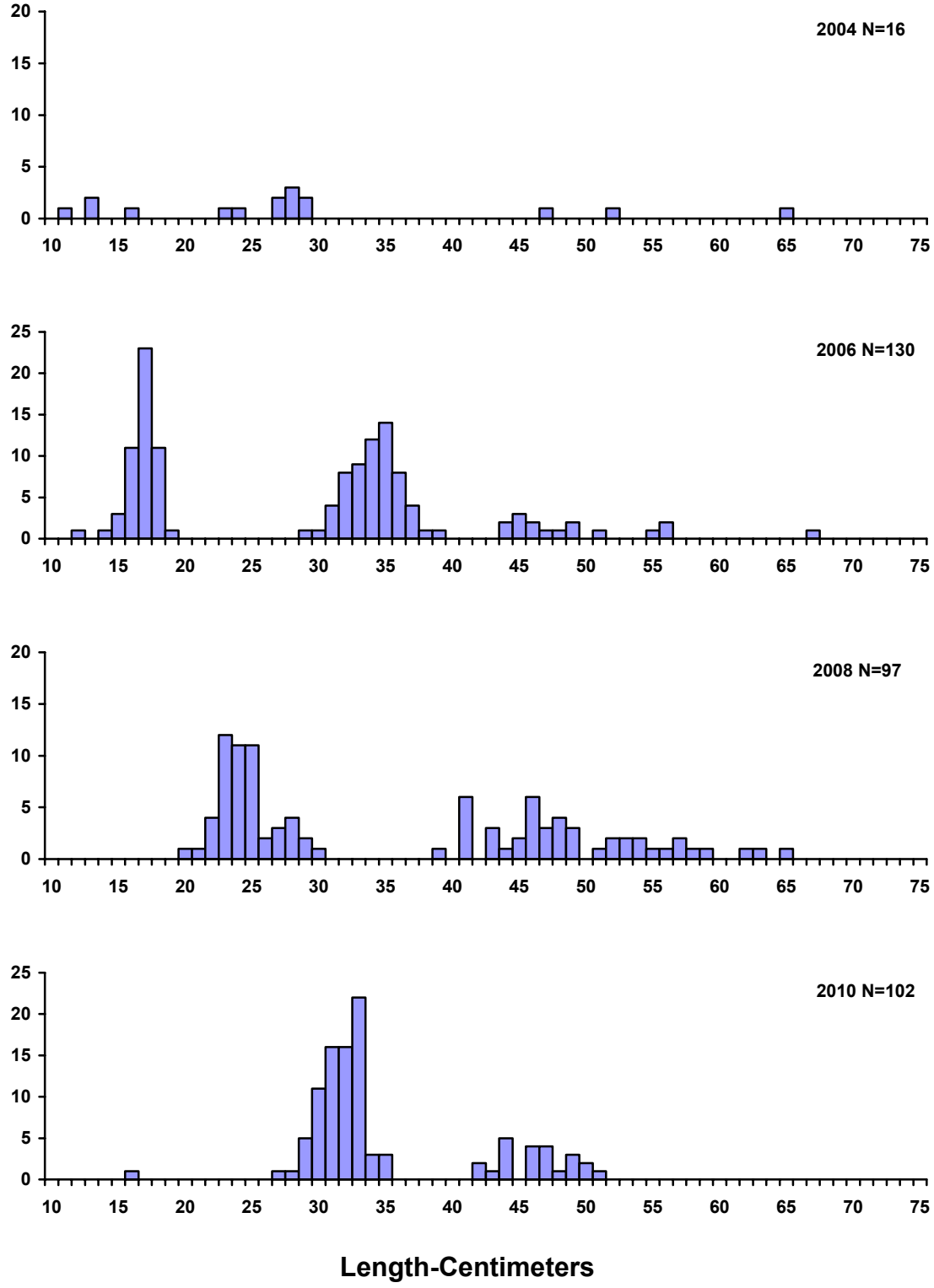


Figure 1. Length frequency histograms for walleye sampled with gill nets in West 81 Lake, Kingsbury County, 2004, 2006, 2008 and 2010.

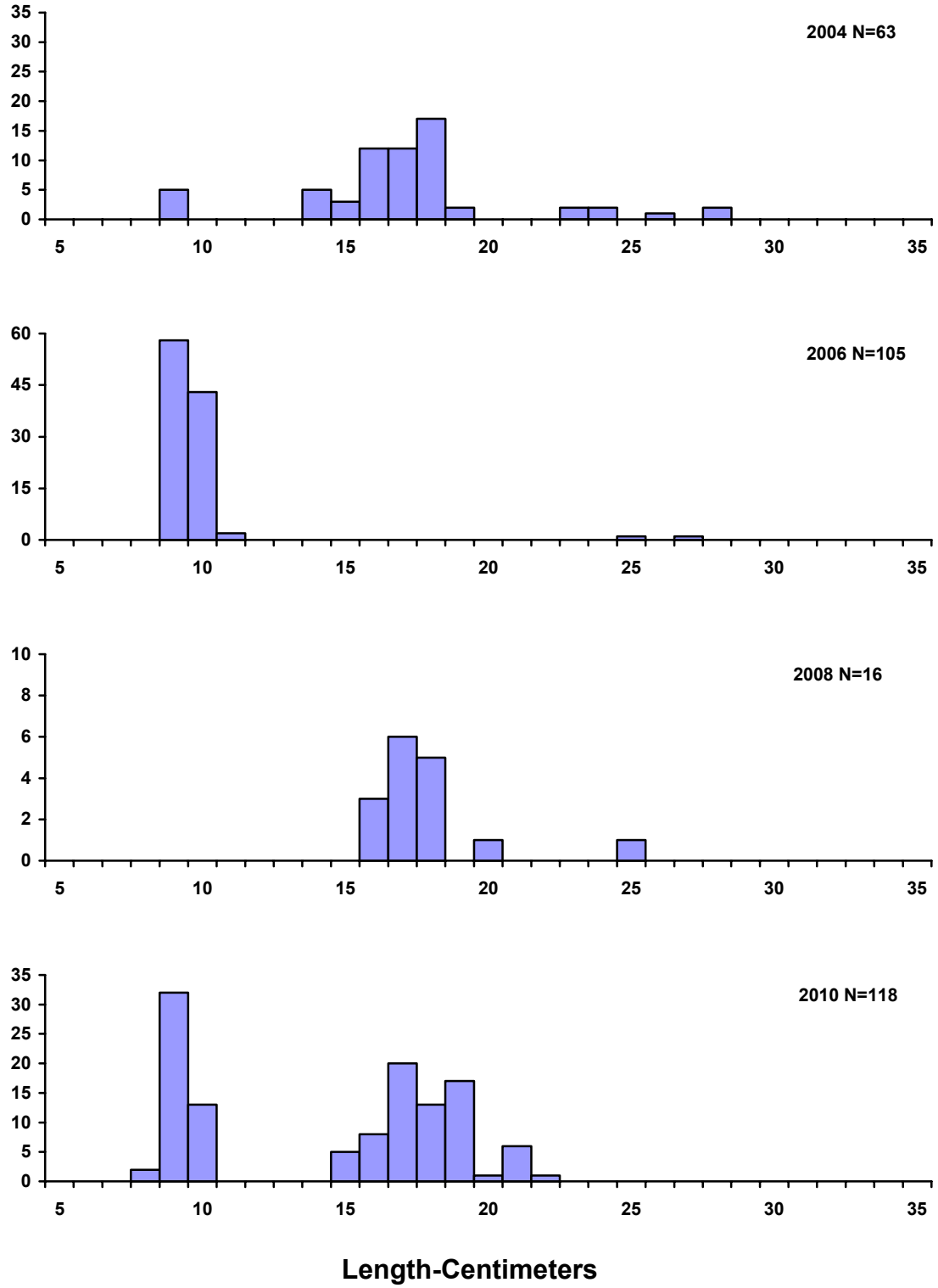


Figure 2. Length frequency histograms for yellow perch sampled with gill nets in West 81 Lake, Kingsbury County, 2004, 2006, 2008 and 2010.

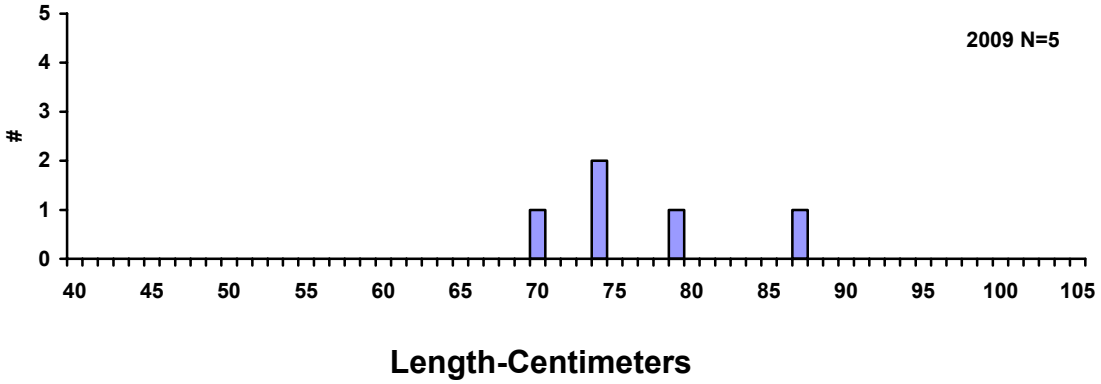
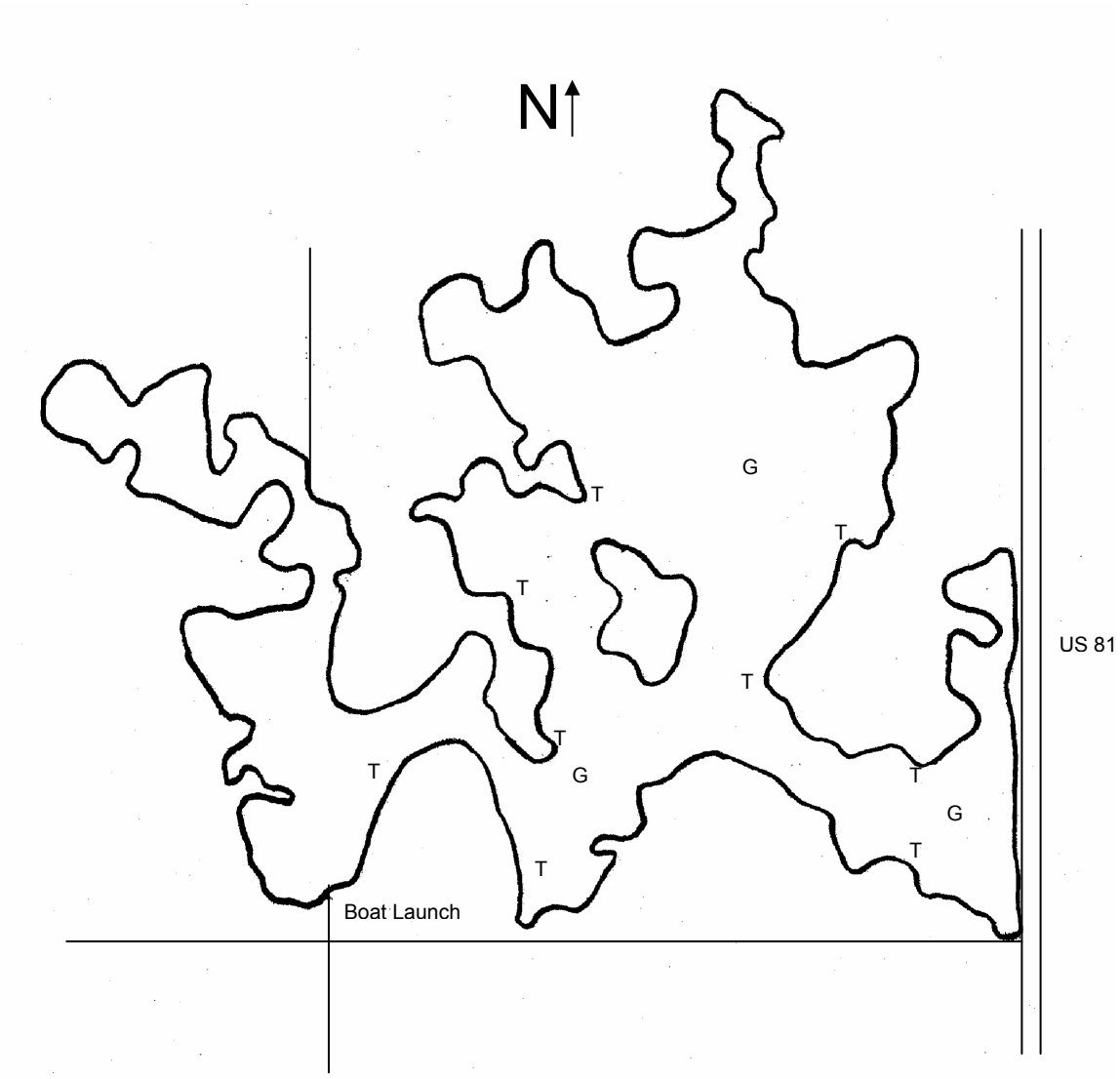


Figure 3. Length frequency histograms for muskellunge sampled with gill nets in West 81 Lake, Kingsbury County, 2009.



Legend
Gill Nets: G
Trap Nets: T
Electrofishing: E

Figure 4. Sampling locations on West 81 Lake, 2010.

Appendix A. A brief explanation of catch per unit effort (CPUE), proportional stock density (PSD), relative stock density (RSD) and relative weight (Wr).

Catch Per Unit Effort (CPUE) is the catch of animals in numbers or in weight taken by a defined period of effort. Can refer to trap-net nights of effort, gill-net nights of effort, catch per hour of electrofishing, etc.

Proportional Stock Density (PSD) is calculated by the following formula:

$$PSD = \frac{\text{Number of fish} > \text{quality length}}{\text{Number of fish} \geq \text{stock length}} \times 100$$

Relative Stock Density (RSD-P) is calculated by the following formula:

$$RSD\text{-}P = \frac{\text{Number of fish} > \text{preferred length}}{\text{Number of fish} \geq \text{stock length}} \times 100$$

PSD and RSD-P are unitless and usually calculated to the nearest whole digit.

Size categories for selected species found in Region 3 lake surveys, in centimeters. (inches in parenthesis).

Species	Stock	Quality	Preferred	Memorable	Trophy
Walleye	25 (10)	38 (15)	51 (20)	63 (25)	76 (30)
Yellow perch	13 (5)	20 (8)	25 (10)	30 (12)	38 (15)
Black crappie	13 (5)	20 (8)	25(10)	30 (12)	38 (15)
White crappie	13 (5)	20 (8)	25(10)	30 (12)	38 (15)
Bluegill	8 (3)	15 (6)	20 (8)	25 (10)	30 (12)
Largemouth bass	20 (8)	30 (12)	38 (15)	51 (20)	63 (25)
Smallmouth bass	18 (7)	28 (11)	35(14)	43 (17)	51 (20)
Northern pike	35 (14)	53 (21)	71 (28)	86 (34)	112 (44)
Channel catfish	28 (11)	41 (16)	61 (24)	71 (28)	91 (36)
Black bullhead	15 (6)	23 (9)	30 (12)	38 (15)	46 (18)
Common carp	28 (11)	41 (16)	53 (21)	66 (26)	84 (33)
Bigmouth buffalo	28 (11)	41 (16)	53 (21)	66 (26)	84 (33)

For most fish, 30-60 or 40-70 are typical objective ranges for “balanced” populations. Values less than the objective range indicate a population dominated by small fish while values greater than the objective range indicate a population comprised mainly of large fish.

Relative weight (Wr) is a condition index that quantifies fish condition (i.e., how much does a fish weigh for its length). A Wr range of 90-100 is a typical objective for most fish species. When mean Wr values are well below 100 for a size group, problems may exist in food and feeding relationships. When mean Wr values are well above 100 for a size group, fish may not be making the best use of available prey.